



# RF



## ORANGE COUNTY AMATEUR RADIO CLUB, INC.

VOL. LII NO. 9

P.O. BOX 3454, TUSTIN, CA 92781-3454

September 2011

### The Prez Sez.....

By Paul W6GMU



This month we have the The ARRL SWD Convention, Hamcon 2011 event to get our Ham Radio juices flowing and further pique our interest in our wonderful hobby. Please see the Hamcon link on the [www.W6ZE.org](http://www.W6ZE.org) homepage, under Announcements, for details.

Further, there's our annual auction coming up at our October General Meeting, so please bring items to sell and be prepared to pounce on the inevitable bargains! Plus, there's the fine Holiday Party to which we can look forward. On Saturday, October 01, the California QSO Party event will take place, as detailed

on Page 3 of this issue of RF. Please peruse the info and consider joining in.

I find that "special events" add spice to our OCARC experience. Hopefully, you find the same to be true and will join in the fun. After all, the more the merrier!

73 de Paul W6GMU



### September General Meeting

#### "Happenings at the ARRL"

Marty Woll - N6VI, Vice-Director of the ARRL Southwestern Division, will be our November guest speaker. He will be keeping us abreast of current developments in Amateur Radio and the ongoing efforts of the League on the behalf of US amateurs.



Heathkit announced they are back in the kit business. Their first kit is due late September. They are looking for kit ideas. Details at: <http://www.heathkit.com>

AF6C

The next general meeting will be on:

**Friday, Sept. 16  
@ 7:00 PM**

As usual, we will be meeting in the east Red Cross Building, Room 208. See you there!

### In This Issue: Page

The Prez Sez .....	1
September Meeting .....	1
CLUB INFORMATION .....	2
Portables in the Park -	
CA QSO Party .....	3
World-Wide DATV QSO Party ....	4
October Club Auction .....	6
Heathkit-of-the-Month .....	8
General Meeting Minutes .....	15
Ham Cuisine .....	17
August Board Minutes .....	18
Special Event Stations .....	19
ARRL Contest Calendar .....	20
OCARC Financial Summary .....	21

**ORANGE COUNTY  
AMATEUR RADIO CLUB**  
[www.W6ZE.org](http://www.W6ZE.org)



**2011 Board of Directors:**

**President:**

Paul Gussow, W6GMU  
(714) 624-1717  
[W6GMU@w6ze.org](mailto:W6GMU@w6ze.org)

**Vice President:**

George Jacob, N6VNI  
(562) 544-7373  
[N6VNI@w6ze.org](mailto:N6VNI@w6ze.org)

**Secretary:**

Doug Britton, W6FKX  
(714) 969-0301  
[W6FKX@w6ze.org](mailto:W6FKX@w6ze.org)

**Treasurer:**

Ken Konechy, W6HHC  
(714) 744-0217  
[W6HHC@w6ze.org](mailto:W6HHC@w6ze.org)

**Membership:**

Jeff Hall, W6UX  
(949) 697-9279  
[W6UX@w6ze.org](mailto:W6UX@w6ze.org)

**Activities:**

Kristin Dankert, K6PEQ  
(714) 544-9846  
[K6PEQ@w6ze.org](mailto:K6PEQ@w6ze.org)

**Publicity:**

Position open

**Technical:**

Bob Eckweiler, AF6C  
(714) 639-5074  
[AF6C@w6ze.org](mailto:AF6C@w6ze.org)

**Directors-At-Large:**

Dan Dankert, N6PEQ  
(714) 544-9846  
[N6PEQ@w6ze.org](mailto:N6PEQ@w6ze.org)

Larry Mallek, K6YUI  
(714) 533-0887  
[K6YUI@w6ze.org](mailto:K6YUI@w6ze.org)

**2011 Club Appointments:**

**W6ZE Club License Trustee:**

Bob Eckweiler, AF6C  
(714) 639-5074  
[AF6C@w6ze.org](mailto:AF6C@w6ze.org)

**Club Historian:**

Bob Evans, WB6IXN  
(714) 543-9111  
[WB6IXN@w6ze.org](mailto:WB6IXN@w6ze.org)

**RF Editor (rotating):**

Doug Britton, W6FKX  
(714) 742-2459  
[W6FKX@w6ze.org](mailto:W6FKX@w6ze.org)

**WEB Master:**

Ken Konechy, W6HHC  
(714) 744-0217  
[W6HHC@w6ze.org](mailto:W6HHC@w6ze.org)

**Assistant WEB Master:**

Bob Eckweiler, AF6C  
(714) 639-5074  
[AF6C@w6ze.org](mailto:AF6C@w6ze.org)

**ARRL Awards Appointee:**

Arnie Shatz, N6HC  
(714) 573-2965  
[N6HC@aol.com](mailto:N6HC@aol.com)

Larry Beilin, K6VDP  
(714) 557-7217  
[K6VDP@aol.com](mailto:K6VDP@aol.com)

**OCCARO Delegate:**

Kristine Jacob, KC6TOD  
(562) 619-8870  
[KC6TOD@W6ZE.org](mailto:KC6TOD@W6ZE.org)

**Monthly Events:**

**General Meeting:**

Third Friday of the month  
at 7:00 PM  
American Red Cross  
601 N. Golden Circle Dr.  
(Near Tustin Ave. & 4<sup>th</sup> St.)  
Santa Ana, CA

**Club Breakfast:**

Second Saturday of every  
month at 8:00 AM  
Jagerhaus Restaurant  
2525 E. Ball Road  
(Ball exit off 57-Freeway)  
Anaheim, CA

**Club Nets (Listen for W6ZE):**

28.375 ± MHz SSB  
Wed- 7:30 PM - 8:30 PM  
Bob AF6C, Net Control

146.55 MHz Simplex FM  
Wed- 8:30 PM - 9:30 PM  
Bob, WB6IXN, Net Control

7.086 ± MHz CW **OCWN**  
Sun- 9:00 AM – 10 AM  
John WA6RND, Net Control

**VISIT OUR WEB SITE**

<http://www.w6ze.org>

for up-to-the-minute club  
information, the latest  
membership rosters, special  
activities, back issues of RF,  
links to ham-related sites,  
vendors and manufacturers,  
pictures of club events and much  
much more.

**Club Dues:**

Regular Members	...\$20
Family Members*	...\$10
Teenage Members	..\$10
Club Badge**	.....\$3

Dues run from Jan thru Dec and are  
prorated for new members.

\*Additional members in the family of  
a regular member pay the family rate  
up to \$30 per family.

\*\*There is a \$1.50 charge if you'd  
like to have your badge mailed to  
you.



## Come join **W6ZE** "Portable in the Park" for the **California QSO Party**!!!



**WHO:** All OCARC members!

**WHAT:** Compete for the club in the California QSO Party!

**WHERE:** Jeffrey Open Space Preserve in Irvine, CA (33.703564, -117.753804)

**WHEN:** Saturday, October 1<sup>st</sup>, 2011 9:00 AM TO 6:00 PM

Please join us for a fun day of Ham contesting in a peaceful park setting located in North Irvine! W6ZE will be entering the **California QSO Party** as a *Multi Station-Multi-Operator Low Power Club Competition* Station.

The CQP is the **most anticipated** QSO party of the year for California Ops because it's the largest QSO party on the contesting calendar and everyone in the world wants to work us!

We'll be fielding an Elecraft K3 on **20m Phone/CW** and an Icom IC-7000 on **10m/15m Phone/CW**, with operation continuing until dark or our batteries are exhausted. For the remainder of the contest club members may compete from their home stations and submit their individual scores for the club's combined score.

Never contested before? No problem! Come and watch experienced contesters to learn how it's done and then make some contacts for the club. You'll learn how to call CQ and hold a frequency down during a contest, similar to how we do it for Field Day. Contesting is one of the most popular disciplines in the Amateur Radio hobby!

Can't make it? No problem! While we'd love to have you come out to the park, **you can compete for the club AT HOME!** Full details on how to do this are available at <http://www.cqp.org/Rules.htm>. The more club members that compete from home and submit scores for the club, the better our chances are at taking the top California Club Station award!

Bathrooms are close by and there is a small picnic area with several tables (please bring your own food and drinks).

### Contest Captains

**Jeff W6UX** ([w6ux@w6ze.org](mailto:w6ux@w6ze.org)) is the 20m station captain and **Tim K6GEP** ([timgep@yahoo.com](mailto:timgep@yahoo.com)) is the 10m/15m station captain for this event. Contact them directly if you would like to pre-register a time slot to operate at the park. You don't have to pre-register, but you may have to wait to operate if you don't. We really want to achieve a high contact rate and have good teachers on hand for new contesters, so experienced ops please come out!

### Directions to the Park:

Take INTERSTATE 5 to the JEFFREY ROAD Exit in Irvine  
Right on JEFFREY ROAD  
Right on LONG MEADOW  
Left on VINTAGE  
Left on LAMPLIGHTER  
Right on GRASSLAND BUNGALOW  
Park between TRIPLE and SHEPARD; park is on the left.  
Take one of the two short dirt trails to the picnic tables.

Visit [maps.google.com](http://maps.google.com) and paste **33.703564,-117.753804** into the search box to get a satellite overview of the area.

**BE SURE TO MARK SATURDAY OCTOBER 1, 2011 ON YOUR CALENDAR**

## TechTalk95

### The VK3RTV World-Wide DATV QSO Party

by Ken Konechy W6HHC

In celebration of the 100 Years of Amateur Radio Victoria providing support for ham radio, organizer Peter Cossins VK3BFG and the hams associated with the VK3RTV digital-ATV repeater conducted the first world-wide DATV QSO Party on August 26-27 (UTC). The VK3RTV repeater is the first in Australia with a two channel multiplexed 100%-digital-transmitting output. In eastern Australia, many hams had contact directly line-of-sight by radio frequencies with the VK3RTV DATV-repeater (near Melbourne). In other parts of Australia, and Thailand, and United States, hams relayed their video to Peter VK3BFG by SKYPE video-connections...who then uplinked the video and audio to the VK3RTV digital repeater using the DVB-S protocol for DATV.

#### Getting a 1.2 GHz DATV Signal to Australia

The W6HHC digital-ATV signal was transmitted on 1.2 GHz using DVB-S protocol for DATV. The signal was then received on a nearby satellite-SetTopBox receiver that sent the video signal over by USB to a Dell notebook computer to be displayed. See **Fig 1** of the W6HHC DATV video being received in Orange, CA.

The next step was to take the video display on the notebook computer and send it over the internet by SKYPE video-connection (called "shared-display" or "shared-desktop") to Peter VK3BFG, the net control station for the DATV QSO Party. See **Fig 2** for a block diagram explaining the video signal path. Peter



**Figure 1 – W6HHC 1.2 GHz DATV Video being Received on SetTopBox/Notebook-Computer**

VK3BFG then uplinked the received SKYPE video to the VK3RTV DATV repeater on 1.2 GHz using DVB-S protocol. The VK3RTV repeater in turn downlinked W6HHC video on 446.5 MHz using the DVB-T protocol.

As shown in **Fig 2**, a 5.8 GHz link direct from the VK3RTV repeater site to an internet gateway sends the video over internet as streaming video to the BATC (British Amateur Television Club) server. Now the VK3RTV video could be seen all over the world through the [www.BATC.TV/](http://www.BATC.TV/) internet URL. It was exciting to watch my DATV video come back from the VK3RTV digital-repeater via the BATC streaming server on the internet. This was an interesting combination of ham radio and internet!

#### Getting my DATV Signal to Australia via W6ATN

Amateur Television Network (ATN) links several ATV repeaters in California-Arizona-NV-NM including W6ATN located on Saddleback Peak in Orange County.

**Figure 2 – Block Diagram Showing W6HHC DATV QSO Straight to Australia**

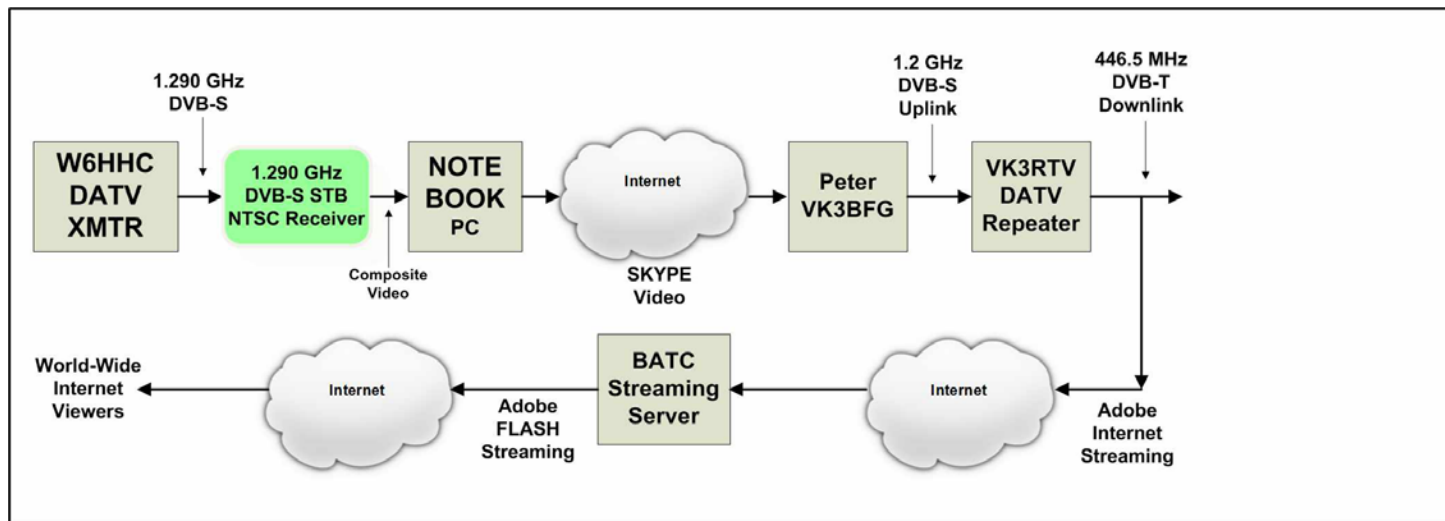
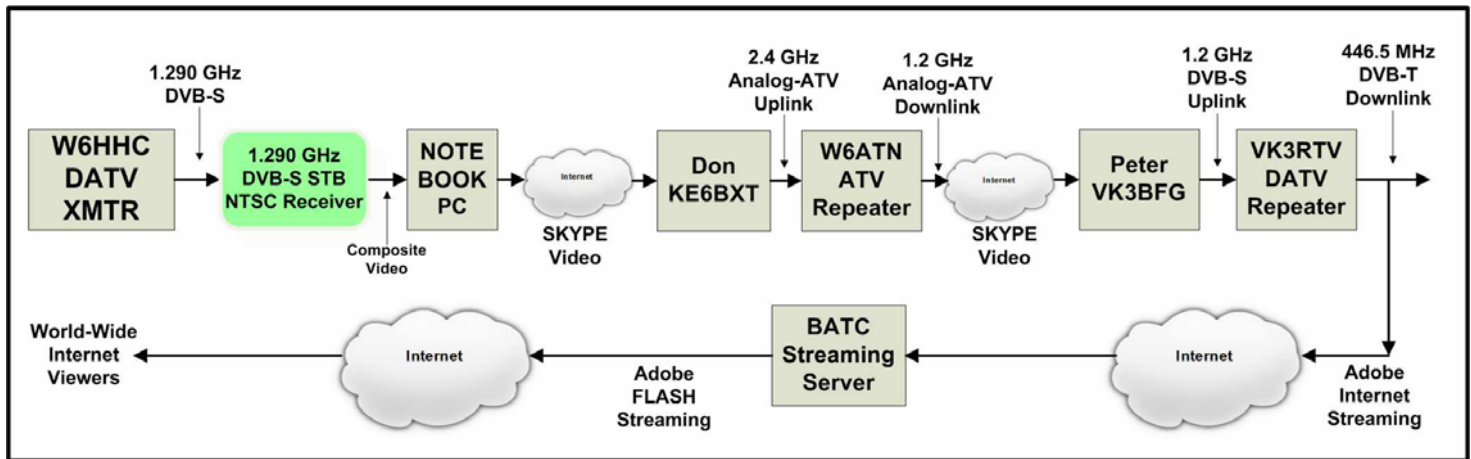




Figure 3 – Block Diagram Showing W6HHC DATV QSO to Australia via W6ATN



Don KE6BXT in Mission Viejo worked very closely with Peter VK3BFG while planning for the DATV QSO Party to allow ATV hams in the US to uplink to W6ATN and then send the W6ATN repeater video to be sent to VK3BFG over the internet using SKYPE video-connection. Don KE6BXT also allowed me to SKYPE my DATV video directly to him. KE6BXT then uplinked my signal to W6ATN on 2.4 GHz and then SKYPE'd the 1.2 GHz ATV downlink to VK3BFG via a separate SKYPE video-connection. **Fig 3** has video path details.



Fig 4 – Typical VK3RTV Repeater Test Pattern seen over the Internet

### Summary

The VK3RTV world-wide DATV QSO Party was a success! Peter VK3BFG reported that he logged a total of 65 QSO's during the DATV QSO Party event, including three VK3 portable DATV stations operating in the field for the event.



Figure 5 – The Larger Picture is Peter VK3BFG testing with Don KE6BXT (smaller PIX in lower corner) (photo courtesy of KE6BXT)

Don KE6BXT reported that 16 different US hams checked into (by RF or by SKYPE-video) the VK3RTV DATV QSO Party via ATN. As said earlier, I thought this QSO Party was really an interesting and exciting inter-mixing of digital-ATV, analog-ATV and internet. My only disappointment was that I could not watch the BATC streaming video on my iPad. This small compatibility glitch was caused by Apple refusing to support FLASH-video on the iPad or iPhone. I want to thank Don KE6BXT for helping me sort out a dozen SKYPE issues before the QSO Party and Peter VK3BFG who took the time to test with Don and me using SKYPE before the QSO Party. The DATV QSO Party was great fun!! I got to meet (see) a lot of DATV hams. I think this event was great promotion of DATV!!

### Interesting DATV Links

- VK3RTV Digital Repeater WEB site – see [www.VK3RTV.com](http://www.VK3RTV.com)
- W6ATN Amateur Television Network (ATN) – see [ATN-TV.org/](http://ATN-TV.org/)
- Amateur Radio Victoria organization – see [www.AmateurRadio.com.au/](http://www.AmateurRadio.com.au/)
- British ATV Club - Digital Forum – see [www.BATC.org.UK/forum/](http://www.BATC.org.UK/forum/)
- British ATV Club – select from about 25 streaming repeaters – see [www.BATC.TV/](http://www.BATC.TV/)
- German ATV portal for streaming repeaters and forum – see [www.D-ATV.net/](http://www.D-ATV.net/)
- Orange County ARC newsletter entire series of DATV articles – see [www.W6ZE.org/DATV/](http://www.W6ZE.org/DATV/)
- Yahoo Group for Digital ATV - see [groups.yahoo.com/group/DigitalATV/](http://groups.yahoo.com/group/DigitalATV/)



# AUCTION !!! AUCTION !!! AUCTION !!!

It's that time of year again. The OCARC annual ham radio auction is Friday, October 21<sup>st</sup> 2011 at 7:00 PM.

Bring your gear to sell. Come bid on other equipment.

This is always a fun event. Bring your ham radio friends too!

Location and a map to our auction are on the next page or visit our website for info.



The Orange County  
Amateur Radio Club "OCARC"  
P.O. Box 3454  
Tustin, CA 92781

Web: [www.w6ze.org](http://www.w6ze.org)

Email: [ocarc\\_info@w6ze.org](mailto:ocarc_info@w6ze.org)

# ANNUAL RADIO AUCTION

Friday, October 21, 2011

## Auction Rules

The OCARC Annual Auction will take place on Friday evening, October 21st, 2010, at 7:00 PM at the American Red Cross facility located at 600 N. Parkcenter Drive, Santa Ana. The room will open at 6:00 PM to allow registration, set-up and viewing. All buyers and sellers are welcome. The following rules for the auction will be in effect:

1. Only ham radio or electronic equipment / items will be auctioned (i.e.: no fishing equipment, etc)
2. Buyers and Sellers must register at the door with the OCARC Treasurer. **There is NO registration fee.**
3. Sellers should number each item in their lot. A tag should indicate the minimum bid they expect.
4. Only 3 items from a Sellers lot will be auctioned during each turn. After auction 3 items, the auctioneer will move on to the next lot. After the first 3 items from every lot have been offered for bidding, the auctioneer will start the second round of auctioning with the next 3 items in Lot #1.
5. Auction bidding will take place as follows:
  - (a) \$0.00-to-\$5.00 bidding will take place in \$0.50 increments.
  - (b) Over-\$5.00-to-\$50.00 bidding will take place in \$1.00 increments.
  - (c) Over-\$50.00-to-\$100.00 bidding will take place in \$5.00 increments.
  - (d) Over-\$100.00 bidding will be in \$10.00 increments.
6. **Rules 4 and 5 may be changed at the auctioneer's discretion to expedite the auction.**
7. Payments for purchased items are due at the end of the auction and shall be by cash or check with the appropriate ID. No two-party checks or credit cards are allowed. Disbursements to the Sellers will be by OCARC check, only. Sellers will be charged 10% of the selling price for items sold by OCARC.

A special table will be set up for donated items. The proceeds of donated items will go to the OCARC.

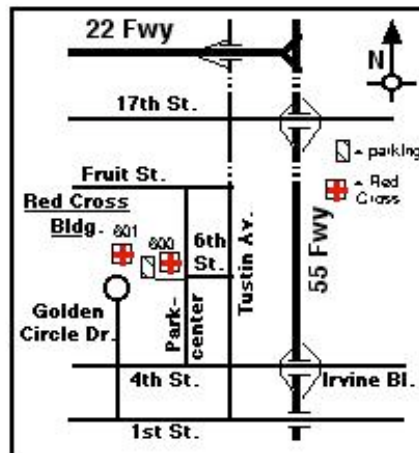
**The American Red Cross  
George M. Chitty Building  
600 Parkcenter Drive  
Santa Ana, CA.**

**Second Floor, Room 208\***  
(Enter from the West Side.)

**Note:** The door locks after 7 PM. If no one is there to let you in call W6ZE on the talk-in frequency for admittance.

**TALK-IN 146.55 MHz Simplex**

\* Room is subject to change.





## Heathkit of the Month #33: by Bob Eckweiler, AF6C



### Heathkit SB-200 / SB-201 HF 1KW Linear Amplifier.

#### Introduction:

*"More Power Scotty; we need more power!"*  
Have you ever wanted to scream that as you are trying to break through the pile-up for that rare DX contact you still need. Sure, you have that transceiver with 100 watts output, but you know you could make the contact more easily with a kilowatt. Wouldn't that mean another S-unit or two?

Before SSB became the popular choice for HF voice communications on the ham bands, amplitude modulation (AM) was the mode most often used. Operating a kilowatt on AM was a big deal. There are linear RF amplifiers and class-C RF amplifiers. The linear amplifier has an efficiency of between 50% and 60% but amplifies the input signal accurately. Class-C amplifiers on-the-other-hand are 75% to 85% efficient but heavily distort any modulation on the input signal. What it does do well is amplify a CW signal.

Thus the typical kilowatt of the day ran class-C with one kilowatt input power that was plate modulated by a high power audio signal of about 50% of the RF power or 500 watts PEP. Thus the kilowatt amplifier would output an 800 watt carrier with about 200 watts in each AM sideband. A linear amplifier was not used since it would not be nearly as efficient and would have to operate at a 100% duty cycle while transmitting. Also transmitting tubes of the era were designed to run class-C and not too many of them really performed well when biased for linear operation. Class-C works well for CW, FM and RTTY too. Since the duty cycle of the carrier is 100% a Class-C kilowatt's



**Figure 1: Heathkit SB-200 Linear Amplifier**

power supply is massive, having to supply not only power for the carrier but power for 500 watts of PEP audio too - a combined average power of about 1,200 watts during transmit.

When SSB became popular so did the linear amplifier. A SSB signal is usually generated at a fixed frequency and a low power level and then heterodyned to the desired operating frequency where it is amplified linearly to the desired output power. The linear amplifier on SSB only has to amplify the one sideband. Thus a kilowatt linear on SSB can produce about 600 watts output on the selected sideband. With SSB communications becoming popular for military, commercial and ham communications, the tube manufacturers redesigned many of their tubes for better linear performance. Two in particular stand out for ham use. They are the Eimac 3-500Z and the United Electronics 572B (or the identical Cetron T-160L).

Model	(Name)	From	To	Final Tube(s)
KL-1*	(Chippewa)	1959	1960	4-400A x 2
HA-10	(Warrior)	1961	1965	811A x 4
<b>SB-200</b>		<b>1964</b>	<b>1978</b>	<b>572-B x 2</b>
HA-14*		1965	1968	572-B x 2
SB-220		1970	1978	3-500Z x 2
SB-230		1974	1978	8873 x 1
<b>SB-201</b>		<b>1978</b>	<b>1983</b>	<b>572-B x 2</b>
SB-221		1978	1983	3-500Z x 2
HL-2200		1983	1984	3-500Z x 2
SB-1000		1987	1992	3-500Z x 1

\* (external power supply required)

**Table 1: Heathkit HF Amplifiers**



Since linear amplifiers, draw power on SSB at the audio duty cycle (often approximated at 30%) or on CW at the key down rate, the power supply can be much less stringent than for AM. Also the development of Hypersil transformers with their size to power advantage allows the manufacturer to incorporate the power supply in the amplifier cabinet if desired.

Heathkit saw the need for HF power amplifiers in the ham community soon after SSB became popular and produced a line of them. The two outstanding amplifiers are the SB-200 and the SB-220. Each of these deserve their own article. The others may be the topic of a later compound article. Table 1 lists them (with the SB-200/201 and SB-220/221 included to show the timeline):

#### The Heathkit SB-200:

The Heathkit SB-200 (see Figure 1) was announced in July 1964, for late August delivery, (See Figure 4) at a kit price of \$200 to complement the SB-300 receiver and SB-400 transmitter. It not only matches their style, it also fits in the same size cabinet - and that includes the power supply. The SB-200 was produced until 1978 when FCC rules required a change to all HF linear amplifiers. The changed version with the nomenclature SB-201 was produced for another five years until 1983 - a total of run of 20 years! In 1973 the kit price was \$229 and in 1983 it sold for \$479.95.

The SB-200 is specified at 1,200 PEP watts input on SSB and 1,000 watts on CW. The efficiency of linear amplifiers are around 60% so the power to the feedline can be expected to be on the order of 820 watts PEP and 700 watts CW. (This includes the 100 watts from the exciter which is fed through the amplifier.) The SB-200 covers the five non-WARC amateur HF bands from 80 meters through 10 meters.

#### Power Supply:

Figure 3 is a schematic of the SB-200. The power supply transformer has three secondaries. A high current 800 volt HV secondary for the voltage doubler circuit. A low current 120

volt secondary winding for bias voltage and to operate the antenna relay. And a 6.3 volt center-tapped winding to provide 8 amps of filament current for the tubes. The primary has dual 120 volt windings that can be wired in parallel for 120 VAC operation, or in series for 240 VAC operation. The 120 VAC cooling fan is connected across one of the 120 VAC transformer windings.



**Figure 2:**  
**Cetron 572B Tube**

Plate-voltage is produced by a full wave voltage doubler circuit consisting of sixteen silicon diodes in two series chains of eight. Filtering is by six electrolytic 125  $\mu$ F 450 volt capacitors in series. Each capacitor is shunted by a 30K $\Omega$  7-watt bleeder resistor. The capacitor closest to ground potential has an additional 700 $\Omega$  resistor in series with its bleeder resistor. The 10 volts that is tapped off at this point is used to set the ALC threshold. The negative end of the high-voltage power supply is connected to ground through a 1 $\Omega$  power resistor. This resistor is a shunt for measuring the plate current. The voltage doubler provides around 2,000 VDC at a 500 ma load, and the effective filter capacitance is 21  $\mu$ F.

The bias supply produces approximately a negative 100 VDC which is fed through the change-over relay coil to the grids of the tubes and also to a 33 $\Omega$  resistor to the external **ANT RELAY** connector (the relay coil is shunted with a 2,700 $\Omega$  resistor). When not transmitting the minus 100 volts is applied to the grids of the tubes to cut off any plate current. Since no current is being drawn by the grids, no current flows through the relay coil and the relay re-

mains in the bypass position. When transmitting, the **ANT RELAY** lead is grounded by contacts on the external transmitter causing current to flow in the relay and switching the amplifier in line. The bias on the grids drops from -100V to about -2 volts, the voltage drop across the 33 $\Omega$  resistor. This bias voltage is applied to the grids and sets the quiescent plate current for the final tubes (about 90 ma.)

### **Final Tubes:**

One of the early era tubes that does well in linear mode is the 811A triode from RCA. This amplifier uses two 572B (T-160L) high-mu graphite plate triodes (see Figure 2), a design improving on the 811A; each tube is capable of 160 watts of plate dissipation. These tubes are connected in parallel running class-B in a grounded grid configuration. The grids are grounded to RF by bypass capacitors but are at a DC potential - a negative 2V bias during transmit and a negative 100V cutoff bias during standby. The loaded plate voltage is on the order of 2,000V. RF drive is provided to the directly heated cathodes. The tubes are mounted horizontally in the cabinet and an electric fan provides the necessary cooling.

### **Driving Circuit:**

Normally the change-over relay is open and the amplifier circuit is bypassed so the input and output RF connectors are connected together through a built-in SWR bridge. When the **ANT RELAY** connector on the back of the amplifier is grounded the relay operates and RF from the exciter is fed to the input circuitry. The input circuitry consists of a broadly tuned factory aligned pi-network circuit for four of the five bands, selected by the band switch. An "L" network is used on 80 meters. The RF is then fed through a capacitor to the cathode of the two tubes. These tubes use a directly heated cathode (i.e. the cathode and the filament are the same tube element) and are designed to warm up instantly. A bifilar wound choke isolates the RF section of the cathode from the filament winding of the power transformer.

### **Output Circuit:**

The amplifier output circuit is a common pi-network. Tuning is by a high voltage 150 pF variable capacitor. Loading is by a dual 457 pF variable capacitor. On 80 meters padding capacitors are switched in parallel with each of the variable capacitors. Inductance for the pi-network is provided by two tapped coils, an air-wound coil for 10 and 15 meters and a coil wound on a ceramic form for 20, 40 and 80 meters. Band selection is by a wafer on the band switch that selects the correct coil segment and on 80 meters switches in the padding capacitors. A 5KV bypass capacitor isolates the DC plate voltage but lets RF pass to the pi-network. Should that capacitor fail a 1.1 mH choke across the RF output will short out the HV tripping the circuit breaker. During transmit the output of the pi-network is fed to the **ANTENNA** connector on the rear panel after passing through the built-in SWR bridge.

### **ALC Circuit:**

The SB-200 amplifier provides automatic level control (ALC) feedback to the exciter. RF energy is coupled through a capacitive voltage divider from the grid of one of the tubes. When the voltage exceeds the ALC voltage a diode conducts and the resulting negative voltage is filtered and appears on the ALC connector on the rear panel. Heathkit transceivers and exciters have an ALC input that allows this voltage to lower drive and prevent the amplifier overdrive, a cause of distortion and unwanted interfering emissions.

### **Metering Circuits:**

The single 200  $\mu$ A (1,400 $\Omega$ ) meter on the front panel of the SB-200 allows measurement of grid current, plate current, high voltage, relative output and SWR. Grid current is measured across a 1.5 $\Omega$  shunt resistor in the grid circuit. Plate current is measured across a 1 $\Omega$  shunt resistor in the power supply divider chain and a 3,600 $\Omega$  series resistor. High voltage is measured through a series chain of three 4.7 M $\Omega$  resistors, with a 15K $\Omega$  resistor shunting the meter. The other two meter positions are for the

built-in Heathkit SWR bridge whose circuit will be discussed in a future series.

### **Building the Heathkit SB-200:**

A lot of the fun of a Heathkit is in the building; something lost on today's instant gratification culture. The kit takes about 16 - 20 hours to build, though some do it (probably less successfully) in 12 hours. The satisfaction when you successfully finish is worth the time.

After inventorying and familiarizing yourself with the kit's parts, the HV circuit board for the power supply is assembled. The board holds the rectifier diodes, electrolytic capacitors and their associated resistors. Next, components such as the transformer, connectors, terminal lugs variable capacitors, the completed circuit board, and others are mounted on the main chassis.

The main chassis is put aside momentarily and parts are mounted on the RF shield including the tube sockets, more terminal strips, the tank coils, and bandswitch, which is assembled in sections on either side of the shield wall. Then the wiring and wired components confined to the RF shield are installed. The RF shield and main chassis are joined, and the chassis bottom is wired. To ease wiring Heath often provides an assembled wiring harness with their kits; this is installed and wires from the various "breakouts" are connected. Additional components are added below the chassis as is the power cord during the "chassis bottom wiring". The SWR bridge components are assembled next; they fit in a shielded area on the inside back chassis.

After some additional structural chassis components are added, chassis top wiring is started; this is mostly confined to the RF compartment where, along with more wiring, the final tubes are installed and their plate caps wired in. Then the meter is mounted on the front panel and the front panel is attached and wired to the main chassis.

Finally the input coils are mounted to the rear of the RF shield and the input wiring is completed, including the bifilar RF filament choke. And the needed cables to connect the amplifier are assembled.

Initial checks are then run. First is a resistance check, followed by the real pièce de résistance - the power is turned on! If the tube filaments light, the meter on HV reads around 2400V and you are not greeted with smoke, flame or a sharp noise, you are on your way to success. After safety steps to be sure the unit is unplugged and the capacitors discharged, the top shield is installed, safety labels are put in place and the amplifier is installed in its cabinet.

The manual then describes installation and operation. It's time for tuning the amplifier in anticipation of that first QSO.

### **The Heathkit SB-200 on the Air:**

Though the SB-200 was designed as a companion for the Heathkit excitors and transceivers of the sixties, seventies and eighties, it quickly became popular in use with other manufactured radios, and is still popular today. If you are using the SB-200 with any of today's transceivers there are a few things you need to take into consideration. First, the **ANT RELAY** connector requires that -120 volts be switched to ground to enable the amplifier. This was easily handled by a relay in the exciter, but most of today's solid-state radios use a transistor instead of a relay and won't handle that high a voltage nor that polarity. There are kits available that add a simple circuit board inside the SB-200 to allow low voltage switching<sup>1</sup>. The nice thing about most of these "low voltage switching" kits is that they continue to allow operation with the older radios with relays.

Operating the SB-200 is a pleasure. The instant warmup of the tubes allows you to go from low power to high power instantaneously, assuming you are tuned up on the band near your current frequency. The tuning is broadband enough that an mild excursion of frequency can

be accomplished without retuning. Of course this also depends on the antenna in use and whether you are using an antenna tuner.

### Heathkit SB-201:

In 1978 the FCC, fed up with all the high power illegal operation by CB enthusiasts on 11 meters, and even on frequencies above 11 meters and into the 10 meter band, passed a law that made it illegal for manufacturers to sell amplifiers that have 10 - 11 meter capability. Thus the SB-201 was born. It is almost identical to the SB-200 with certain changes. The most obvious is that the front panel is missing the 10 meter mark on the band switch. The band switch and input and output circuits are also modified to remove 10 meters. Finally a riveted filter has been added to the input line to filter out 10 and 11 meter signals. Heathkit, with FCC approval, allowed hams to buy the parts to add 10 meters if they ordered the needed parts and sent along a valid copy of their ham license.

### Modifying, Restoring the Heathkit SB-200/201:

Besides returning the 10 meter band to the SB-201 there have been a lot of articles published in the various ham magazines on modifications to this amplifier. Operation on 160 and 6 meters as well as the WARC bands have all been discussed. (If you are planning on putting the SB-200 on six meters, just be advised that the tubes are rated for 30 MHz for full output.) Still, these articles all attest to the popularity of this amplifier.

In addition to the many articles, numerous pages on the web are dedicated to restoring this amplifier. Many of these are informative but I did come across a few that offered bad advice. One recommended replacing the 125  $\mu$ F filter capacitors (a total capacity of 21  $\mu$ F) with 470  $\mu$ F units (a total capacity of 78  $\mu$ F). The author stated that the amplifier "surged" when turned on but the circuit breakers tripped only "occasionally". Since resetting a circuit breaker involves raising the top cover (two screws) and removing the top shield (and its 21 sheet-metal screws), "occasionally" seems way to often. Besides the surge taxes the transformer and the

**September 2011 - RF Newsletter – Page 12**

doubler diodes; bigger isn't always better. A reputable company, Harbach Electronics has a kit that replaces the HV circuit board, and they upgraded the capacitors to 180 $\mu$ F, (a total capacity of 30  $\mu$ F) a much more reasonable value; their board also includes higher performance diodes, precision metering resistors and a more efficient bleeder resistor chain.

Another place on the web, (or it might have been the same site) comments that the filament voltage at their tubes measures only 4-1/2 volts instead of 6.3 volts. They say this is okay; I say either their voltmeter is broken, the transformer is shot or, most likely there is a bad connection in the filament circuit. The filaments draw 8 amps so a bad connection of less than a quarter ohm will drop the voltage down to 4.5 volts. Running these tubes on such a low filament voltage will damage the emission capability of their thoriated tungsten filaments; the specs say 6.3 V  $\pm$ 0.3V. If it were my amplifier I'd find the real problem.

So beware of some of these Internet sites if you are going to update a kit. Also be cautious of the high voltage in the amplifier. It has a lot of amperage capability behind it and is likely fatal if you get across it.

Harbach Electronics <sup>1</sup> and RF Parts <sup>2</sup> are good sources for accessory and replacement parts.

73, from AF6C



Notes:

1. Harbach Electronics:

<http://www.harbachelectronics.com>

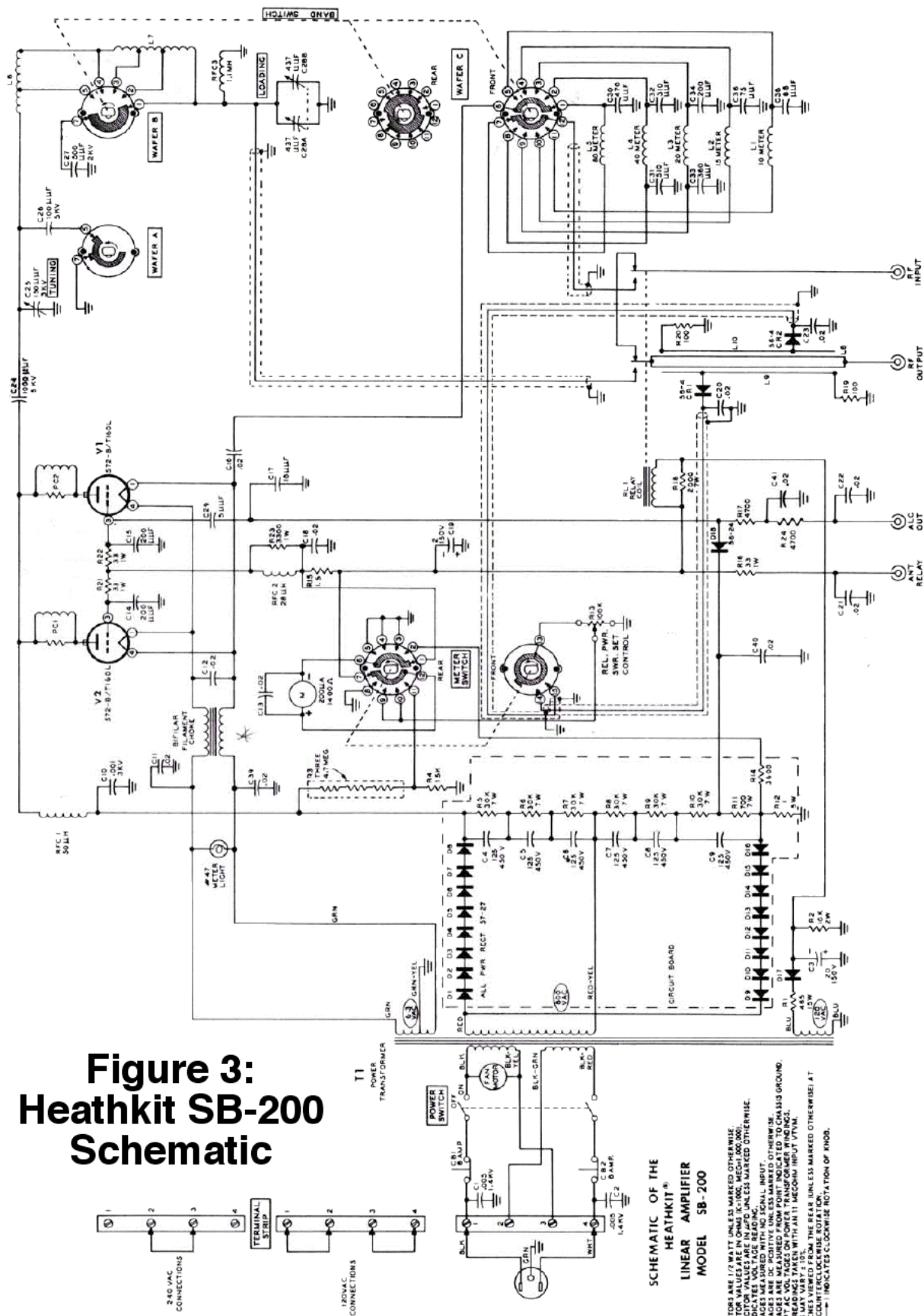
2. RF Parts: <http://www.rfparts.com>

*This article is Copyright 2011 R. Eckweiler and The OCARC.*

*Remember if you come across any old Heathkit Manuals or Catalogs that you do not need, please pass them along to me.*

*Thanks - AF6C*

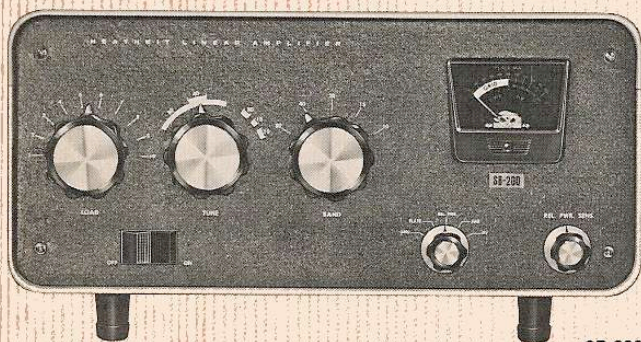






# Heathkit Deluxe SSB Amateur Gear

And Linear You've Been Waiting For!



SB-200  
\$200<sup>00</sup>

Available  
Late August

## Heathkit SB-200 Kilowatt Linear Amplifier ... Latest in this Deluxe SSB Amateur Series!

- 1200 watts P.E.P. SSB—1000 watts CW • 80 through 10 meter band coverage • Built-in SWR meter—Antenna relay—Solid-state power supply • Automatic Load Control (ALC) • Shielded, fan-cooled amplifier compartment • Pre-tuned cathode input circuit for maximum efficiency & low distortion • Circuit-breaker power supply protection—no fuses • Designed for 120/240 volt operation

Here is the latest addition to the sensational new Heathkit deluxe SSB amateur series . . . a completely self-contained desk-top KW Linear Amplifier that is handsomely styled to match the new SB-300 Receiver and SB-400 Transmitter.

Neat, compact and transportable (only 35 lbs.), the SB-200 Linear provides 1200 watts P.E.P. in a high efficiency grounded-grid circuit for greatly-extended amateur communications.

The many advanced design features incorporated in the SB-200 include a pre-tuned cathode input circuit for maximum efficiency and low distortion . . . ALC output for automatic exciter control . . . a rugged, conservatively rated solid-state power supply, protected by circuit-breakers (no fuses to replace or worry about) . . . two heavy-duty 572B/T-160-L final amplifier tubes, fan-cooled for maximum life . . . complete shielding for maximum TVI protection and stability . . . plus a built-in SWR meter and antenna relay. The antenna is automatically transferred to the exciter when the linear is switched "Off."

Well-constructed throughout, the SB-200 features a heavy-gauge one-piece aluminum chassis, partitioned for extra strength and isolation of circuits, and a clean circuit layout for a compact, yet lightweight unit that can be used anywhere. The power supply is designed for operation on either 120 volt or 240 volt power sources.

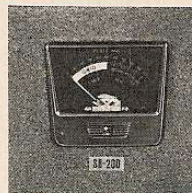
Designed for complete operating versatility the SB-200 is an ideal companion for the SB-400 Transmitter, the soon to be released SB-100 Transceiver, and nearly all other popular SSB & CW excitors in use today! When you go "high-power" . . . choose the SB-200 for extra value, performance and dependability!

Kit SB-200, 42 lbs. . . \$20 dn., \$17 mo. . . . . \$200.00

**SB-200 SPECIFICATIONS**—Band coverage: 80, 40, 20, 15 & 10 meters. Maximum power input: 1200 watts P.E.P. SSB, 1000 watts CW. Driving power required: 70 to 100 watts, depending upon frequency. Duty cycle: SSB, continuous voice modulation; CW, 50% (key down time-not to exceed 5 min.). Third order distortion: 30 db or better at 1000 watts P.E.P. Output impedance: 50 to 75 ohm unbalanced; variable pi-output circuit. SWR not to exceed 2:1. Input impedance: 52 ohm unbalanced; broad-band pretuned input circuit requires no tuning. Meter functions: 0-100 ma grid current, 0-1000 ma plate current, 0-1000 relative power, 1:1 to 3:1 SWR, 1500 to 3000 volts high voltage. Front panel controls: Load; Tune; Band; Relative Power Sensitivity; Meter Switch; Grid-Plate-Rel. Power-SWR-HV; and Power Switch, on/off. Tube complement: Two 572B/T-160-L (in parallel). Power requirements: 120 volts AC @ 16 amperes (max.), 240 volts AC @ 8 amperes (max.). Cabinet size: 14 7/8" W x 6 1/4" H x 13 3/4" D. Net weight: 35 lbs.

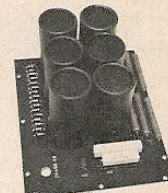


THROUGH HEATH  
NEW  
RESEARCH



### BUILT-IN PANEL METER

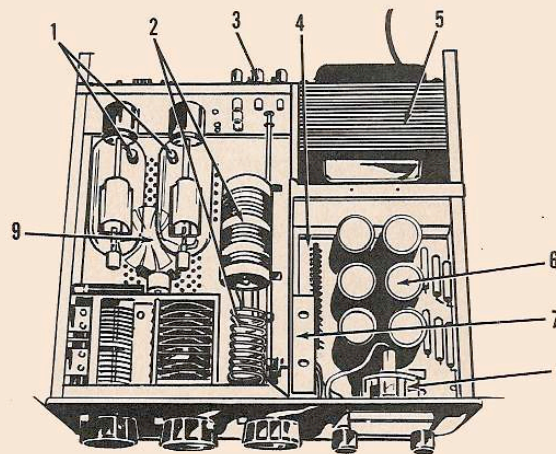
Measures grid current, plate current, relative power output, SWR (standing wave ratio) and high voltage (switch-selected) for simple tune-up and maximum operating efficiency.



### SOLID-STATE POWER SUPPLY

Long-life silicon rectifiers and high capacity filter assure smooth DC output and excellent dynamic regulation. All parts mount on a heavy-duty circuit board for easy assembly.

TOP QUALITY CONSERVATIVELY-RATED COMPONENTS ARE USED THROUGHOUT THE DESIGN OF THE SB-200 TO ASSURE EXTRA YEARS OF DEPENDABLE, TROUBLE-FREE PERFORMANCE.



1. Two heavy-duty 572B/T-160-L tubes in parallel
2. Separate pi-network output coils for 80-20 meters & 15-10 meters
3. Pretuned cathode input circuits
4. Long-life silicon high-voltage rectifiers
5. Conservatively rated 120/240 volt power transformer
6. High capacity (125 mfd ea.) voltage-doubler filter capacitors
7. Two manual-reset circuit breakers for power supply protection
8. Switched panel meter measures SWR, Rel. Pwr., plate current, grid current, & high voltage
9. Fan-cooled final amplifier compartment for long tube life

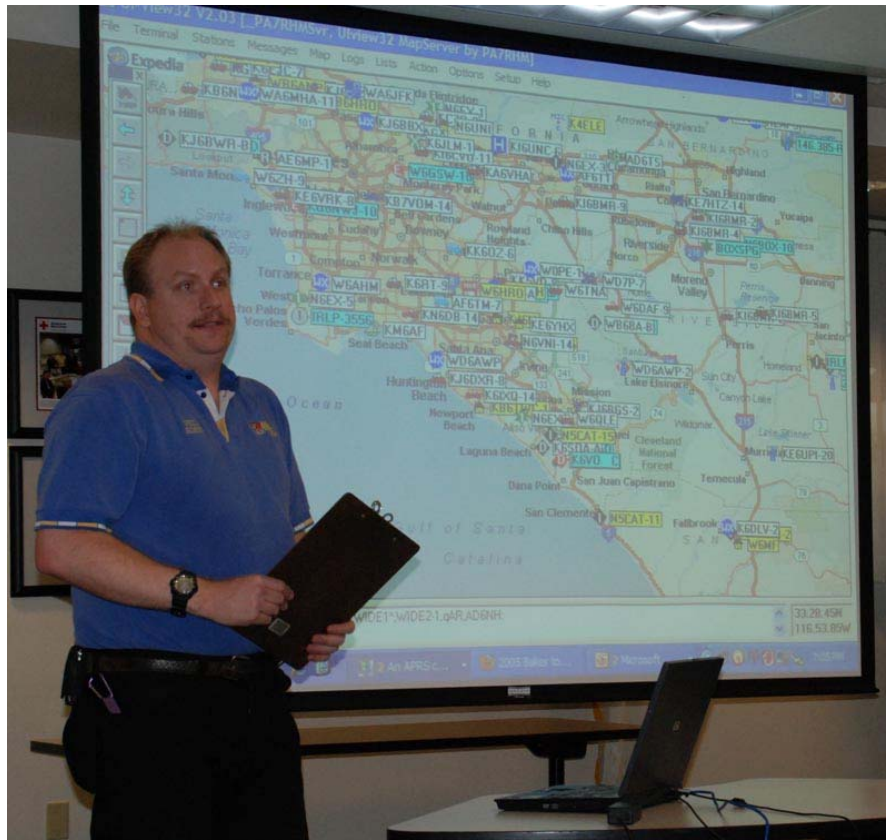
Figure 4: Heathkit Introduces the SB-200 Kilowatt Linear Amplifier  
Heathkit Catalog 800/47 - July 1964



## OCARC GENERAL MEETING MINUTES August 19, 2011

Submitted by Doug Britton W6FKX

The OCARC April General Meeting was held at the Red Cross complex in Santa Ana at 7:00 pm on Friday evening, August 19, 2011. A total of 41 members and 11 guests attended. OCARC Club President Paul Gussow W6GMU called the meeting to order and led the Pledge of Allegiance. Phillip Pacier AD6NH, our speaker for the evening, was introduced by our club Vice President George Jacob N6VNI. Phil presented an enthusiastic talk covering the commonly utilized and lesser utilized aspects of APRS, Automatic Packet Reporting System. Phil opined that most hams do not understand the full capability of APRS; most use it solely for GPS tracking of their mobile or portable station. However its capabilities allow much more.



*Phillip Pacier AD6NH describing the multiple uses of APRS*

Phi continued to describe how the system can be used for 2-way information exchanges for example during emergencies, and transmission of data tied to defined objects on a map. According to Phil, there are approximately 40,000 users of APRS worldwide, reflecting about 2% of the hams in a given area.

OCARC General Meeting Minutes, contd.

## Announcements

Jeff Hall W6UX reminded the club of the upcoming California QSO Party scheduled for October 1; the club is planning a Portables-in-the-Park at Jeffreys Park in Irvine to coincide with the contest. Jeff encouraged members to attend the club event, practice contesting skills, and continue with the contest from home. Jeff pointed out that individuals operating from home during the QSO party can submit their scores under the W6ZE club sign. If you are interested in scheduling operating time during Portables-in-the-Park, contact Jeff at [W6UX@w6ze.org](mailto:W6UX@w6ze.org).

Ken Konechy W6HHC reminded the club to utilize the simplex frequency 146.55 during the drive into general meetings.

## Good of the Club

Bob Eckweiler AF6C informed the club that Heathkit is beginning to bring electronics kits back to the market; they are soliciting kit ideas.

George Jacob N6VNI encouraged attendance at the upcoming HAMCON scheduled for September.

## Show and Tell

Nicholas demonstrated the set-up of a portable station, including power, rig, and a tunable vertical antenna. Nicholas had constructed a basic antenna analyzer allowing him to tune the vertical very quickly. Thanks Nicholas!

Jeff Hall W6UX presented a simple push-to-talk project he recently completed allowing him to easily operate and log on the computer during contests. Nice job, thanks Jeff.

Meeting adjourned at 8:58 pm.

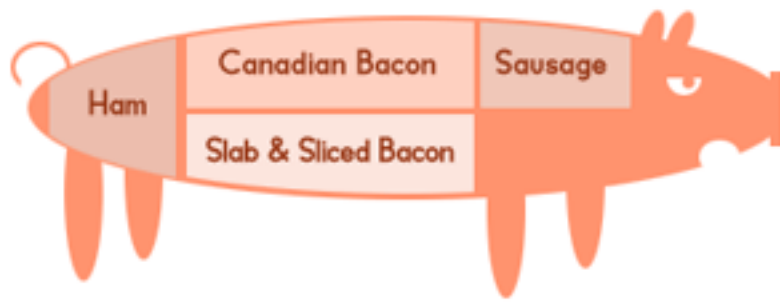


*Nicholas Haban AF6CF shows us a solar power source for his portable HF kit*



*Jeff W6UX demonstrates his "finger" PTT switch*





## Ham Cuisine

*by Kristin, K6PEQ*

### Black Bean Pork Chili

#### Ingredients:

1 pound lean ground pork  
1 medium red OR green bell pepper, chopped  
1 medium onion, chopped  
4 cloves garlic, minced  
1 1/2 teaspoons ground cumin  
2 15-oz. cans black beans, rinsed and drained  
1 14 1/2-oz. can diced tomatoes, undrained  
1 cup water  
2 teaspoons dried oregano, crushed  
1/2 teaspoon salt  
1 teaspoon lime juice  
Shredded Cheddar cheese  
Nonstick cooking spray  
Flour tortillas (optional)

#### Directions:

Coat heavy, large covered pot with nonstick cooking spray. Heat over medium-high heat. Add pork, bell pepper, onion, garlic and cumin. Cook and stir until pork is brown and vegetables are tender, stirring occasionally. Drain off fat. Stir black beans, undrained tomatoes, water, oregano and salt into mixture in pot. Bring to boiling; reduce heat. Simmer, covered, for 30 minutes. Uncover; simmer about 15 minutes more or until desired consistency. Stir in lime juice. Ladle into soup bowls. Sprinkle each serving with Cheddar cheese. Serve with tortillas, if desired.

Serves 4 to 6.

## OCARC Board Meeting Minutes August 13, 2011

### ORARC Board Meeting Minutes for: August 13, 2011

The ORARC Board meeting was held at the Jager-Haus Restaurant, 2525 East Ball Road, Anaheim, at 8:16AM Saturday, August 13, 2011. There were a total of 4 directors present. There was not a quorum with the directors' present.

#### DIRECTOR REPORTS:

- President Paul W6GMU – no report
- Vice President George N6VNI (absent) Paul W6GMU submitted George's report, August speaker Phillip Pacier from HRO will present on APRS at the general meeting..
- Treasurer Ken W6HHC – Reported that the club started the year at approximately \$5,500, taken in \$2,300, and spent \$3,000. Recent bill to be paid included the clubs web site fee.
- Secretary – Doug W6FKX acknowledged and thanked Kris Jacob KC6TOD for taking July's general meeting minutes.
- Activities Kristin K6PEQ - absent.
- Membership Jeff Hall W6UX – no update.
- Technical Bob AF6C - absent.
- Publicity – office is not filled. Doug W6FKX offered to assume the duties for the remainder of the year.
- Director Larry K6YUI – absent.
- Director Dan N6PEQ – absent.

#### OLD BUSINESS:

- **RF Newsletter “Rotating” Editors – thank you to all who volunteer!**
  - September – Doug W6FKX
  - October - Kris KC6TOD
  - November – Ken W6HHC
  - December – Bob AF6C
  -
- **Field Day – Final Thoughts** – Jeff W6UX reflected that size/scope of field day should reflect the numbers of committed volunteers rather than plan a large field day and hope that volunteers arrive to help and staff. Agreed that further participation from band-captains with staffing would have helped.

- **Portables in the Park – October 1, 2011 at Jeffrey Park in Irvine.** Jeff W6UX planned the event to coordinate with the CA QSO Party to highlight contest operating. Bands planned include 20M phone and CW and 10/15M phone and CW. Also mentioned that club members can operate from home and submit their scores as W6ZE.

#### NEW BUSINESS

- **New Publicity Board Member** – Doug W6FKX offered to assume the duties of Publicity for the remainder of the year. A new publicity officer will not be recruited for remainder of the year.
- **Mobile Drive-in Show and Tell** - Jeff W6UX and Doug W6FKX voiced enthusiasm for the drive-in mobile ham show and tell. To be further discussed and planned.
- **October club auction** – Doug W6FKX to bring up at general meeting, preparing members to think about and plan for the event.
- Field Day shirts are available on the ARRL website.

**GOOD OF THE CLUB** Ken W6HHC reported that the server hosting the clubs website was down this past week.

Motion made to adjourn meeting by Paul W6GMU, and seconded by Ken W6HHC. Meeting adjourned at 8:57 AM.

*Respectfully submitted: by Doug Britton W6FKX*



## Upcoming Special Event Stations

### **National POW/MIA Recognition Day**

**Sep 10-Sep 18, 0000Z-2359Z, K4MIA**, Loxahatchee, FL. PBSE Radio Society. 21.300 18.150 14.265 PSK 14.070 7.185. QSL. Michael Bald, 6758 Hall Blvd, Loxahatchee, FL 33470. SASE required. We are trying to operated from 68-16425 UH1H Huey helicopter at the VA Hospital. Please take time to honor our POWs/MIAs on Friday Sept 16. [grz.com/db/k4mia](http://grz.com/db/k4mia)

### **Always Remember 10th Anniversary of the Attacks of 9/11/2001**

**Sep 10-Sep 11, 0200Z-0400Z, N1Y**, Hancock, NY. Symbol Technologies Amateur Radio Club. 50.135 14.070 7.240 3.911 D-Star REF10C. QSL. STARC, One Motorola Plaza, B-13, Holtsville, NY 11742. Reading one name of the fallen with every QSO. Special Event QSL with #10 SASE. [w2sbl@motorolasolutions.com](mailto:w2sbl@motorolasolutions.com)

### **Route 66 On The Air Special Event**

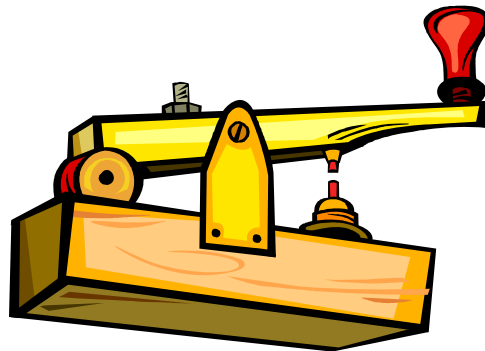
**Sep 10-Sep 18, 0001Z-2359Z, W6A-W6Q & W6T**, San Bernardino, CA. Citrus Belt Amateur Radio Club. 21.366 14.266 7.266 3.866. Certificate. Citrus Belt Amateur Radio Club, PO Box 3788, San Bernardino, CA 92413. 12th Annual Route 66 On The Air Special Event; rules and other info see [www.w6jbt.org](http://www.w6jbt.org)

### **Pentagon Tenth Anniversary Commemoration of 9-11 Attacks**

**Sep 11-Sep 12, 1100Z-0100Z, K4AF**, Arlington, VA. Pentagon Amateur Radio Club. 21.290 14.240 7.190 3.815. QSL. Pentagon Amateur Radio Club, PO Box 2322, Arlington, VA 22202. Active operating frequencies posted during event at [www.k4af.org](http://www.k4af.org). Operation to honor all those lost on 9-11, with special remembrance of the 184 people who lost their lives at the Pentagon and on board American Airlines Flight 77. [www.k4af.org](http://www.k4af.org)

### **Transmitting from Nowhere, KS**

**Oct 8, 1400Z-1800Z, W0UK**, Nowhere, KS. Douglas County Amateur Radio Club. 20 m 146.760 tone 88.5. Certificate. Ken Blair, 1329 Kasold Dr D2, Lawrence, KS 66049. DCARC invites you to find us on 20 m. Transmitting from Nowhere, KS, a stop along Midland Rail Road. [www.w0uk.net](http://www.w0uk.net)



## **2011 ARRL CONTEST SCHEDULE**

### **September**

10-12 September VHF QSO Party

17-18 10 GHz and Up Contest (round 2)

24-25 International EME Competition (2.3 GHz +)

### **October**

22-23 EME Contest, 50-1296 MHz (round 1)

17-21 School Club Roundup

### **November**

5-7 November Sweepstakes, CW

19-21 November Sweepstakes, Phone

19-20 EME Contest, 50-1296 MHz (round 2)

### **December**

2-4 ARRL 160 Meter Contest

10-11 ARRL 10 Meter Contest

18 Rookie Roundup - CW



9/3/2011

Page 1

**OCARC 2011 Cash Flow - YTD**

1/1/2011 through 9/3/2011

Category Description	1/1/2011- 9/3/2011
<b>INFLOWS</b>	
ARRL Membership Income	115.00
Badge Income	29.00
BADGE MAILING	1.00
Donations - FD	555.00
Dues, Family	277.50
Dues, Membership	1,065.00
Interest	2.66
Opportunity Drawing -Monthly	539.68
<b>TOTAL INFLOWS</b>	<b>2,584.84</b>
<b>OUTFLOWS</b>	
ARRL Membership Expense	98.00
Donations - OC FAIR	100.00
Dues - OCCARO	20.00
Field Day Equipment	432.99
Field Day Food	973.03
Field Day Other	55.32
Field Day Rental - Tent	58.72
Field Day Rental - U-Haul	340.49
Flowers Expense	63.51
Misc.	1.07
Opportunity Drawing - Monthly	844.99
PO Box Rental	42.00
Supplies	7.61
Web Site Hosting	107.91
<b>TOTAL OUTFLOWS</b>	<b>3,145.64</b>
<b>OVERALL TOTAL</b>	<b>-560.80</b>

**OCARC Bank Balance ~\$5,100**